

SMALL GASOLINE ENGINES C.D.E.

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General Instructions

IMPORTANT NOTE: BRIGGS AND STRATTON IS MODEL 130G32-0022-F1 is the only engine acceptable for use in the contest.

NOTE: Any device capable of wireless transmission, including, but not limited to: cell phones, palm pilots, or personal digital assistants are prohibited. The use of any such device will result in disqualification from the event. Digital devices with calculator capabilities may be used at the time of completion of the *Job Sheet*, or other time specified by the judge(s).

Participation and Total Points – A team will be comprised of two contestants from the same school. Team and individual awards will be awarded. Contestants will work individually on Parts I, II and III. They will work cooperatively on Parts IV, VI, VII, VIII and IX. Each individual will receive half of the points awarded in Parts V, IV, VI, VII, VIII and IX. There is a maximum of 640 points per team and 320 per individual.

Part I: Written Exam – 100 pts. /team: 50 pts. /individual

At PA FFA Activities Week, it is expected that contestants be in official dress for Tuesday's activities.

Missing or improper items of official dress will warrant a docking of points from the written exam score not to exceed 25 points per individual.

The exam will cover selection, engine theory, and principles of operation, maintenance, repair, adjustment and service of the two-stroke and four-stroke cycle multi-fuel engines. The questions will be constructed from information supplied in the following resources. This is a "closed book" test.

1 Briggs & Stratton Small Engines Textbook: Part# CE8020

2 Briggs & Stratton Small Engine Care and Repair: Part# 274041

3 Briggs & Stratton Service and Repair Instructions: #381573EN available for free download at the PowerPortal

4 Equipment and Engine Training Council: Study Guides; 2 Stroke, 4 Stroke, and Compact Diesel.

<http://www.eetc.org/certification/forms.html>

Part II: Using the Service Manual and Parts Manual – 100 pts. /team: 50 pts. /individual

Each contestant will supply their own (current as per *Required Tools Checklist* specifications) Briggs & Stratton Service and Repair Instructions manual. Contestants will use the service manual to determine measurements, adjustments, service, and maintenance procedures for designated engine models. The service manual, parts manual, and price lists will be the only references permitted for this section. *Parts manuals and price lists will be provided, if required, for this activity.* Students may be expected to use T-gauges, small-hole gauges, feeler gauges, and/or plug gauges and read inside- and outside micrometers and/or dial calipers. There will be a 10-point deduction per page or part thereof for any other papers, notes, etc. Contestants will be supplied with necessary engine model information prior to beginning this section. Students may be expected to obtain replacement parts numbers and prices for specified engines.

Part III: Tool and Parts Identification – 40 pts. /team: 20 pts. /individual

Contestants will identify by correct name, from the list provided, various parts of small engines as well as various tools used to repair small engines. No reference material permitted.

Part IV: Tool Inventory

Team toolboxes will be inventoried to verify that they have the required tools listed on the *Required Tools Checklist*. The checklist is provided to ensure that all teams will have the appropriate tools to conduct troubleshooting and repair operations. Deductions will be assessed as identified on the checklist. Additional tools not specifically identified on the checklist are permitted. The Briggs & Stratton OHV Service and Repair Instructions manual (as specified on the

Required Tools Checklist) is the only reference that will be permitted during the engine repair portion of the C.D.E. Any other charts, papers, references, checklists or other notes are prohibited. A 10-point deduction per page or any part thereof will be assessed. Spare parts are not permitted. A 25-point deduction will be assessed for each spare or marked part.

Part V: Engine Arrival Checklist

Engines will be checked upon arrival to verify that they meet the specifications set forth in the Engine Arrival Checklist. Point deductions are identified on the checklist. ***Special note: Fuel tank, fuel lines, and carburetor must be ABSOLUTELY DRY to avoid point deductions regarding fuel in the engine.***

Part VI: Troubleshooting Checklist – 30 pts. /team: 15 pts/individual

Immediately following the scenario, contestants will complete a troubleshooting checklist indicating their strategy for repairing the engine. The contest committee will determine time allocation. At the end of this session, contestants will begin engine troubleshooting and repair.

Part VII: Engine Repair – 200 pts. /team: 100 pts. / Individual

This section entails troubleshooting and repairing an engine. The engine will be “bugged” (defected) in some manner and may require that the contestants look up part numbers and order correct replacement parts. Engine “bugs” may require the removal of the crankcase cover assembly and thus will necessitate that students are knowledgeable in how to do so without draining the oil from the engine. If the bug is of a nature that oil must be temporarily drained, containers for doing so will be provided. Team members will work cooperatively and will be allotted an appropriate amount of time, to be not be less than 30 minutes, in which to repair the engine. For scoring purposes, teams will be given a specific “flat-rate” time to be used when completing the job sheet, independent of the actual time allotted to fix the engine. The contestants will be provided a verbal scenario representing information given to the service manager by the “customer” when the engine was submitted for repair. Questions regarding the scenario are permitted with the understanding that all contestants will hear the question and answer. Top no-load governed speed will be announced at the beginning of this session Points for Part VII are as follows:

Safety and Work Habits – 30 pts. /team Safety glasses meeting ANSI Z.87 specifications must be worn. Contestants must wear suitable work clothes and shoes. **SNEAKERS ARE NOT PERMITTED.** Work habits will be observed and deductions will be given for unsafe or improper practices. For scoring purposes, all questionable behaviors/practices will be noted by the judges during observation then deductions agreed upon by consensus at a meeting of the judges following the engine repair portion of the event.

Engine Safety – 10 pts. /team Engine **must** be secured while attempting to start or run the engine. Safe practices must be exhibited if the engine is not secure while it is not running.

Fuel Safety – 30 pts. /team Engines will be fueled by the judges prior to the start of the troubleshooting portion of the event.

Tool Use and Safety – 30 pts. /team Contestants will be observed for proper tool use and safe handling of tools. Scoring follows guidelines for that of *Safety and Work Habits*.

Engine Speed – 100 pts. /team Points in this section are awarded to teams that are able to start their engine. Speed will be measured using the team’s digital tachometer as per the *Required Tools Checklist*. Engines must be able to run safely within **±50 RPM** of the designated idle speed and **±100 RPM** of the designated top no-load speed. If an engine is deemed by the judge(s) to be unsafe to run, no points will be awarded. The decision of the contest committee will be final. Engines that run but leak gas will be deemed unsafe. Points will be awarded in the following manner: Engine doesn’t run or is deemed unsafe to be run: 0 points Engine runs but does not achieve either of the designated speeds: 20 points Engine runs but only achieves one of the two designated speeds: 50 points Engine runs properly and achieves both designated speeds: 100 points

Part VIII: Job Sheet – 100 pts. /team: 50 pts. /individual

Contestants will be required to fill out the job sheet completely. Neatness of the final product is important since it is an indicator of attention to detail and pride in work completed. Pennsylvania Sales Tax must be calculated based on the subtotal of parts *and* labor. The flat rate time and billed hourly rate will be provided at the time the scenario is presented. All contestants will use the flat rate time provided to calculate the labor charge.

Part IX: Oral Report – 60 pts. /team: 30 pts. /individual

Upon completion of the job sheet, students will meet with the customer to present the bill, explain the services performed and answer customer questions. The score will be divided evenly between the contestants. Scoring premiums will be awarded to reports in which team members participated equitably during presentation.

Engine Arrival and other Information: The Briggs & Stratton 130G32-0022-F1 is the only acceptable model.

Engines must be transported in a secure wooden, aluminum, or plastic/polymer box (with handles) of a size and weight that can be lifted and moved by an average individual.

All tools must fit in the single toolbox or the engine box. No loose tools or multiple toolboxes permitted.

The team is responsible for delivering their engine and toolbox to the designated location by 1:00 pm on Tuesday. Time and pick-up location will be posted in the registration area. Disqualification will result if the engine or toolbox is not present when judges begin the “bugging” process. Normally, a U-Haul straight truck is typically parked visibly in the lot near the basketball court. Team members should remove their repair manuals and take them to the written activity on Tuesday.

All engines must be mounted by four (4) 5/16" or 3/8" carriage bolts onto a piece of plywood measuring at least 1/2" thick and at least 10" X 10" in each dimension and be accompanied by two appropriately sized C-clamps with which to secure the engine to the table for starting. Mounting bolts must be cut and filed/ground to the top of the nut.

Toolboxes, engines and service manuals must all be clearly identified with the chapter or school name. Repair Manuals are to remain with the contestants on Tuesday for use in Part II of the contest and are to be brought to the contest site by the contestant on Wednesday. **The toolbox must accompany the engine. Both the engine box and toolbox must be unlocked.**

The engine must be properly filled with oil prior to arrival.

See Part V: Engine Arrival for fuel-in-engine guidelines.

Engines must have been demonstrably previously disassembled.

Engine parts may not be marked in any way. Marked parts will receive a **25-point** deduction.

All engines are to arrive with no sparkplug. There is to be no sparkplug installed or included in the engine box. A sparkplug will be provided on the day of the contest.

If officials fault engines by installing non-functioning parts, teams must ask for replacements by bringing the part number and part name to the designated parts person. Requests for improper parts will be met with a “Not in Stock” response from the parts person. All faulty parts that are not found must be returned at the conclusion of the event and they will be replaced with the original parts.

Gasoline will be furnished for the competition. Initial fueling will be conducted by the judges prior to the commencement of the troubleshooting and repair component of the event.

Engines will be evaluated for performance in the presence of the contestants. Team members will assist in the evaluation of their engines by following the instructions of officials in starting, idling and removing engine parts as directed. The digital tachometer provided by the team will be used to evaluate engine speed for scoring purposes.

Upon completion of the event, it will be the team’s responsibility to remove engines and tools from the contest site according to the designated time frame. C.D.E. officials, The Pennsylvania State University, and the hosting site will bear no responsibility for lost or stolen equipment and/or tools.